ENGLISH

SHARP

SCIENTIFIC CALCULATOR

EL-509X
EL-531X
EL-531XG
MODEL **EL-531XH**

OPERATION MANUAL

PRINTED IN CHINA / IMPRIMÉ EN CHINE / IMPRESO EN CHINA
10HSC (TINSE0658THZZ)

INTRODUCTION

Operational Notes

- Do not carry the calculator around in your back pocket, as it may break when you sit down. The display is made of glass and is particularly fragile.
- Keep the calculator away from extreme heat such as on a car dashboard or near a heater, and avoid exposing it to excessively humid or dusty environments.
- Since this product is not waterproof, do not use it or store it where fluids, for example water, can splash onto it. Raindrops, water spray, juice, coffee, steam, perspiration, etc. will also cause malfunction.
- Clean with a soft, dry cloth. Do not use solvents or a wet cloth. Avoid using a rough cloth or anything else that may cause scratches.
- Do not drop it or apply excessive force.
- Never dispose of batteries in a fire.
- Keep batteries out of the reach of children.
- This product, including accessories, may change due to upgrading without prior notice.

NOTICE

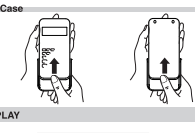
- SHARP strongly recommends that separate permanent written records be kept of all important data. Data may be lost or altered in virtually any electronic memory product under certain circumstances. Therefore, SHARP assumes no responsibility for data lost or otherwise rendered unusable whether as a result of improper use, repairs, defects, battery replacement, use after the specified battery life has expired, or any other cause.
- SHARP will not be liable nor responsible for any incidental or consequential economic or property damage caused by misuse and/or malfunctions of this product and its peripherals, unless such liability is acknowledged by law.

♦ Press the RESET switch (on the back), with the tip of a ball-point pen or similar object, only in the following cases. Do not use an object with a breakable or sharp tip. Note that pressing the RESET switch erases all data stored in memory.

- When using for the first time
- After replacing the batteries
- To clear all memory contents
- When an abnormal condition occurs and all keys are inoperative.

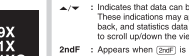
If service should be required on this calculator, use only a SHARP servicing dealer, SHARP approved service facility, or SHARP repair service where available.

Hard Case

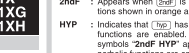


DISPLAY

- During actual use, not all symbols are displayed at the same time.
- Certain inactive symbols may appear visible when viewed from a far off angle.
- Only the symbols required for the usage under instruction are shown in the display and calculation examples of this manual.



: Appears when the entire equation cannot be displayed. Press ◀ / ▶ to see the remaining (hidden) section.



: Indicates that data can be visible above/below the screen. These indications may appear when menu, multi-line playback, and statistics data are displayed. Press ▲ / ▼ to scroll up/down the view.

2ndF : Appears when 2ndF is pressed, indicating that the functions shown in orange are enabled.

HYP : Indicates that HYP has been pressed and the hyperbolic functions are enabled. If 2ndF HYP is pressed, the symbols "**2ndF HYP**" appear, indicating that inverse hyperbolic functions are enabled.

ALPHA: Indicates that ALPHA (STAT/VAR), STO or RCL has been pressed, and entry (recall) of memory contents and recall of statistics can be performed.

FIX/SCI/ENG: Indicates the notation used to display a value and changes by SET UP menu.

DEG/RAD/GRAD: Indicates angular units and changes each time DRG is pressed.

STAT : Appears when statistics mode is selected.

M : Indicates that a numerical value is stored in the independent memory.

BEFORE USING THE CALCULATOR

Key Notation Used in this Manual

In this manual, key operations are described as follows:

To specify e^x : 2ndF e^x
To specify $\ln$: $\ln$
To specify F : ALPHA F

Functions that are printed in orange above the key require 2ndF to be pressed first before the key. When you specify the memory, press ALPHA first. Numbers for input value are not shown as keys, but as ordinary numbers.

Power On and Off

Press ON/C to turn the calculator on, and 2ndF OFF to turn it off.

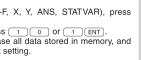
Clearing the Entry and Memories

Clearing methods are described in the table as follows:

Clearing operation	Entry (Display)	M^{*1}	A-F, X, Y^{*2} ANS^{*3}	STAT^{*4} STAT·VAR^{*5}
ON/C	○	×	×	×
2ndF CA	○	×	○	○
2ndF M-CLR 0 0^{*6}	○	○	○	○
2ndF M-CLR 1 0^{*7}	○	○	○	○
RESET switch	○	○	○	○

○ : Clear × : Retain
*1 Independent memory M.
*2 Temporary memory A-F, X and Y.
*3 Last answer memory.
*4 Statistical data (entered data).
*5 $\bar{x}$, sx, σx, n, Σx, Σx^2, $\bar{y}$, sy, σy, Σy, Σy^2, Σxy, r, a, b, c.
*6 All variables are cleared. See 'About the Memory clear key' for details.
*7 This key combination functions the same as the RESET switch. See 'About the Memory clear key' for details.

[About the Memory clear key]
Press 2ndF M-CLR to display the menu.



- To clear all variables (M, A-F, X, Y, ANS, STAT·VAR), press 0 0 or 0 ENT.
- To RESET the calculator, press 1 0 or 1 ENT. The RESET operation will erase all data stored in memory, and restore the calculator's default setting.

Entering and Correcting the Equation

[Cursor keys]

- Press ◀ or ▶ to move the cursor. You can also return to the equation after getting an answer by pressing ▶ (◀). See the next section for using the ▲ and ▼ keys.
- In the SET UP menu and other locations, use the ◀ or ▶ key to move the flashing cursor, then press ENT ((=) key). If you need to scroll up/down the view, use the ▲ or ▼ key.

[Insert mode and Overwrite mode in the Equation display]

- This calculator has two editing modes: insert mode (default), and overwrite mode. Pressing 2ndF INS switches between the two modes. A triangular cursor indicates that an entry will be inserted at the cursor, while the rectangular cursor indicates to overwrite preexisting data as you make entries.
- To insert a number in the insert mode, move the cursor to the place immediately after where you wish to insert, then make a desired entry. In the overwrite mode, data under the cursor will be overwritten by the number you enter.
- This mode setting will be retained until the next RESET operation is executed.

[Deletion key]

- To delete a number/function, move the cursor to the number/function you wish to delete, then press DEL. If the cursor is located at the right end of an equation, the DEL key will function as a back space key.

Multi-line Playback function [1]

This calculator is equipped with a function to recall previous equations in the normal mode. Equations also include calculation ending instructions such as "=" and a maximum of 142 characters can be stored in memory. When the memory is full, stored equations are deleted in the order of the oldest first. Pressing ▲ will display the previous equation and the answer. Further pressing ▲ will display preceding equations (after returning to the previous equation, press ▼) to view equations in order). In addition, 2ndF ▲ can be used to jump to the oldest equation.

- To edit an equation after recalling it, press ▶ (◀).
- To edit the displayed equation, press ▶ ((◀)) immediately after obtaining a calculation answer.
- The multi-line memory is cleared by the following operations: 2ndF CA, 2ndF OFF (including the Automatic Power Off feature), mode change, memory clear (2ndF M-CLR), RESET, 2ndF RESET, ALPHA, RCL, ANS, constant calculation, chain calculation, angle unit conversion, coordinate conversion, N-base conversion, numerical value storage to the temporary memories and independent memory, and input/deletion of statistical data.

Priority Levels in Calculation

This calculator performs operations according to the following priority: ① Fractions (1⌟4, etc.) ② Functions preceded by their argument (x^{-1}, x^3, $n!$, etc.) ③ x^y, $\sqrt[x]{\ }$ ④ Implied multiplication of a memory value (2Y, etc.) ⑤ Functions followed by their argument (sin, cos, etc.) ⑥ Implied multiplication of a function (2sin30, etc.) ⑦ nCr, nPr ⑧ ×, ÷ ⑨ +, − ⑩ AND ⑪ OR, XOR, XNOR ⑫ =, M+, M−, ⇒M, ▶DEG, ▶RAD, ▶GRAD, DATA, CD, →n, →xy and other calculation ending instructions

- If parentheses are used, parenthesized calculations have precedence over any other calculations.

INITIAL SET UP

Mode Selection

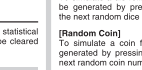
Normal mode (NORMAL): MODE 0
Used to perform arithmetic operations and calculations.

Statistics mode (STAT): MODE 1
Used to perform statistical calculations.

When executing mode selection, temporary memories, statistical variables, statistical data and last answer memory will be cleared even when reselecting the same mode.

SET UP menu

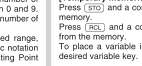
Press SET UP to display the SET UP menu.



- A menu item can be selected by:
  - moving the flashing cursor by using ▶ / ◀, then press ENT ((=) key), or
  - pressing the number key corresponding to the menu item number.
- If ▲ or ▼ is displayed on the screen, press ▲ or ▼ to view the previous/next menu screen.
- Press ON/C to exit the SET UP menu.

[Selecting the Display Notation and Decimal Places]
The calculator has four display notation systems (Floating point, Fixed decimal point, Scientific notation and Engineering notation) for displaying calculation results.

- When the FIX, SCI, or ENG symbol is displayed, the number of decimal places (TAB) can be set to any value between 0 and 9. Displayed values will be reduced to the corresponding number of digits.
- If a floating point number does not fit in the specified range, the calculator will display the result using the scientific notation (exponential notation) system. See 'Setting the Floating Point Numbers System in Scientific Notation' for details.
- Press SET UP, followed by 0, to display the following submenu:



[Setting the Floating Point Numbers System in Scientific Notation]
The calculator has two settings for displaying a floating point number: NORM1 (default setting) and NORM2. In each display setting, a number is automatically displayed in scientific notation outside a preset range:

- NORM1: $0.000000001 \leq |x| \leq 9999999999$
- NORM2: $0.01 \leq |x| \leq 9999999999$

100000÷3=		
[Floating point (NORM1)]	ON/C 100000 ÷ 3 =	33'333.33333
→[Fixed decimal point]	SET UP 5 0	33'333.33333
[TAB set to 2]	SET UP 5 1 2	33'333.33
→[SCIentific notation]	SET UP 5 1	3.33×10^{04}
→[ENGineering notation]	SET UP 5 1 2	33.33×10^{03}
→[Floating point (NORM1)]	SET UP 5 3	33'333.33333
3÷1000=		
[Floating point (NORM1)]	ON/C 3 ÷ 1000 =	0.003
→[Floating point (NORM2)]	SET UP 5 4	$3.\times10^{-03}$
→[Floating point (NORM1)]	SET UP 5 3	0.003

Determination of the Angular Unit

In this calculator, the following three angular units (degrees, radians, and grads) can be specified.

SCIENTIFIC CALCULATIONS

- Press MODE 0 to select the normal mode.
- In each example, press ON/C to clear the display. And if the FIX, SCI, or ENG indicator is displayed, clear the indicator by selecting 'NORM1' from the SET UP menu.

Arithmetic Operations [2]

- The closing parenthesis) just before = or M+ may be omitted.

Constant Calculations [3]

- In constant calculations, the addend becomes a constant. Subtraction and division are performed in the same manner. For multiplication, the multiplicand becomes a constant.
- When performing calculations using constants, constants will be displayed as K.

Functions [4]

- Refer to the calculation examples of each function.
- Before starting calculations, specify the angular unit.

Random Function

The Random function has four settings for use in the normal or statistics mode. (This function cannot be selected while using the N-Base function.) Press ON/C to exit.

- The generated pseudo-random number series is stored in memory Y. Each random number is based on a number series.

[Random Numbers]
A pseudo-random number, with three significant digits from 0 up to 0.999, can be generated by pressing 2ndF RANDOM 0 ENT. To generate the next random number, press ENT.

[Random Dice]
To simulate a die-rolling, a random integer between 1 and 6 can be generated by pressing 2ndF RANDOM 1 ENT. To generate the next random dice number, press ENT.

[Random Coin]
To simulate a coin flip, 0 (head) or 1 (tail) can be randomly generated by pressing 2ndF RANDOM 2 ENT. To generate the next random coin number, press ENT.

[Random Integer]
An integer between 0 and 99 can be generated randomly by pressing 2ndF RANDOM 3 ENT. To generate the next random integer number, press ENT.

Angular Unit Conversions [5]

Each time 2ndF DRG▶ are pressed, the angular unit changes in sequence.

Memory Calculations [6]

This calculator has 8 temporary memories (A-F, X and Y), one independent memory (M) and one last answer memory (ANS). The independent memory and temporary memories are only available in the normal mode.

[Temporary memories (A-F, X and Y)]
Press STO and a corresponding variable key to store a value in memory.
Press RCL and a corresponding variable key to recall a value from the memory.
To place a variable in an equation, press ALPHA, followed by a desired variable key.

[Independent memory (M)]
In addition to all the features of temporary memories, a value can be added to or subtracted from an existing memory value.
Press ON/C STO M to clear the independent memory (M).

[Last answer memory (ANS)]
The calculation result obtained by pressing = or any other calculation ending instruction is automatically stored in the last answer memory.

Note:

- Calculation results from the functions indicated below are automatically stored in memories X or Y. For this reason, when using these functions, be careful with the use of memories X and Y.
  - Random function ..... Y memory
  - →r(θ, →(r, ... X memory (r or x), Y memory (θ or y)
- Temporary memories and last answer memory are cleared even when the same mode is reselected.
- Use of RCL or ALPHA will recall the value stored in memory using up to 14 digits.

Chain Calculations [7]

- This calculator allows the previous calculation result to be used in the following calculation.

- The previous calculation result will not be recalled after entering multiple instructions.
- In the case of utilizing postfix functions (√‾, sin, etc.), you can perform a chain calculation even when the previous calculation result is cleared by the use of the ON/C key.

Fraction Calculations [8]

This calculator performs arithmetic operations and memory calculations using fractions, and conversion between a decimal number and a fraction.

- If the number of digits to be displayed is greater than 10, the number is converted to and displayed as a decimal number.

Binary, Pental, Octal, Decimal, and Hexadecimal Operations (N-Base) [9]

This calculator can perform conversions between numbers expressed in binary, pental, octal, decimal and hexadecimal systems. It can also perform the four basic arithmetic operations, calculations with parentheses and memory calculations using binary, pental, octal, decimal, and hexadecimal numbers. In addition, the calculator can carry out the logical operations AND, OR, NOT, NEG, XOR and XNOR on binary, pental, octal and hexadecimal numbers.
Conversion to each system is performed by the following keys:

2ndF ▶BIN : Converts to the binary system, "**b**" appears.
2ndF ▶PEN : Converts to the pental system. "**P**" appears.
2ndF ▶OCT : Converts to the octal system. "**o**" appears.
2ndF ▶DEC : Converts to the hexadecimal system. "**H**" appears.
2ndF ▶DEC : Converts to the decimal system. "**b**", "**P**", "**o**", and "**H**" disappear from the display.

Conversion is performed on the displayed value when these keys are pressed.

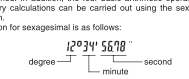
Note: In this calculator, the hexadecimal numbers A − F are entered by pressing y^x, $\sqrt[x]{\ }$, x^2, x^3, log, and ln, and displayed as follows:

A → ƒ, B → δ, C → ℓ, D → ơ, E → ξ, F → ƒ

In the binary, pental, octal, and hexadecimal systems, fractional parts cannot be entered. When a decimal number having a fractional part is converted into a binary, pental, octal, or hexadecimal number, the fractional part will be truncated. Likewise, when the result of a binary, pental, octal, or hexadecimal calculation includes a fractional part, the fractional part will be truncated. In the binary, pental, octal, and hexadecimal systems, negative numbers are displayed as a complement.

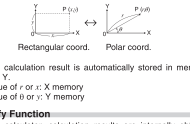
Time, Decimal and Sexagesimal Calculations [10]

Conversion between decimal and sexagesimal numbers can be performed. In addition, the four basic arithmetic operations and memory calculations can be carried out using the sexagesimal system.
Notation for sexagesimal is as follows:



Coordinate Conversions [11]

- Before performing a calculation, select the angular unit.



- The calculation result is automatically stored in memories X and Y.
  Value of r or x: X memory
  Value of θ or y: Y memory

Modify Function [12]

In this calculator, calculation results are internally obtained in scientific notation with up to 14 digits for the mantissa. However, since calculation results are displayed in the form designated by the display notation and the number of decimal places indicated, the internal calculation result may differ from that shown in the display. By using the modify function, the internal value is converted to match that of the display, so that the displayed value can be used without change in subsequent operations.

STATISTICAL CALCULATIONS [13]

Statistical calculations are performed in the statistics mode. Press MODE 1 to select the statistics mode. This calculator performs the seven statistical calculations indicated below. After selecting the statistics mode, select the desired sub-mode by pressing the number key corresponding to your choice.
When changing to the statistical sub-mode, press the corresponding number key after performing the operation to select the statistics mode (press MODE 1).

0 (SD) : Single-variable statistics
1 (LINE) : Linear regression calculation
2 (QUAD) : Quadratic regression calculation
3 (EXP) : Exponential regression calculation
4 (LOG) : Logarithmic regression calculation
5 (PWR) : Power regression calculation
6 (INV) : Inverse regression calculation

The following statistics can be obtained for each statistical calculation (refer to the table below):

Single-variable statistical calculation

Statistics of ①

Linear regression calculation

Statistics of ① and ②, and, in addition, estimate of y for a given x (estimate y') and estimate of x for a given y (estimate x')

Exponential regression, Logarithmic regression, Power regression, and Inverse regression calculation

Statistics of ① and ②. In addition, estimate of y for a given x and estimate of x for a given y. (Since the calculator converts each formula into a linear regression formula before actual calculation takes place, it obtains all statistics, except coefficients a and b, from converted data rather than entered data.)

Quadratic regression calculation

Statistics of ① and ② and coefficients a, b, c in the quadratic regression formula ($y = a + bx + cx^2$). (For quadratic regression calculations, no correlation coefficient (r) can be obtained.) When there are two x values, press 2ndF ←→.
When performing calculations using a, b and c, only one numeric value can be held.

①	$\bar{x}$	Mean of samples (x data)
	sx	Sample standard deviation (x data)
	σx	Population standard deviation (x data)
	n	Number of samples
	Σx	Sum of samples (x data)
	Σx^2	Sum of squares of samples (x data)
②	$\bar{y}$	Mean of samples (y data)
	sy	Sample standard deviation (y data)
	σy	Population standard deviation (y data)
	Σy	Sum of samples (y data)
	Σy^2	Sum of squares of samples (y data)
	Σxy	Sum of products of samples (x, y)
	r	Correlation coefficient
	a	Coefficient of regression equation
	b	Coefficient of regression equation
	c	Coefficient of quadratic regression equation

- Use ALPHA and RCL to perform a STAT variable calculation.

Data Entry and Correction [14]

Entered data are kept in memory until 2ndF CA are pressed or mode selection. Before entering new data, clear the memory contents.

[Data Entry]
Single-variable data
Data DATA
Data (↓,↑) *frequency* DATA (To enter multiples of the same data)
Two-variable data
Data x (→) *Data y* DATA
Data x (→) *Data y* (↓,↑) *frequency* DATA (To enter multiples of the same data x and y.)

- Up to 100 data items can be entered. With the single-variable data, a data item without frequency assignment is counted as one data item, while an item assigned with frequency is stored as a set of two data items. With the two-variable data, a set of data items without frequency assignment is counted as two data items, while a set of items assigned with frequency is stored as a set of three data items.

[Data Correction]
Correction prior to pressing DATA immediately after a data entry:
Delete incorrect data with ON/C, then enter the correct data.
Correction after pressing DATA:
Use ▲ / ▼ to display the data previously entered.
Press ▼ to display data items in ascending (oldest first) order. To reverse the display order to descending (latest first), press the ▲ key.
Each item is displayed with '*Xn=*', '*Yn=*', or '*Nn=*' (*n* is the sequential number of the data set).
Display the data item to modify, input the correct value, then press DATA. Using (↓,↑), you can correct the values of the data set all at once.

- When ▲ or ▼ appears, more data items can be browsed by pressing ▲ or ▼.
- To delete a data set, display an item of the data set to delete, then press 2ndF CD. The data set will be deleted.
- To add a new data set, press ON/C and input the values, then press DATA.

Statistical Calculation Formulas [15]

Type	Regression formula
Linear	$y = a + bx$
Exponential	$y = a \bullet e^{bx}$
Logarithmic	$y = a + b \bullet \ln x$
Power	$y = a \bullet x^b$
Inverse	$y = a + b\frac{1}{x}$
Quadratic	$y = a + bx + cx^2$

In the statistical calculation formulas, an error will occur when:

- The absolute value of the intermediate result or calculation result is equal to or greater than 1×10^{100}.
- The determinator is zero.
- An attempt is made to take the square root of a negative number.
- No solution exists in the quadratic regression calculation.

ERROR AND CALCULATION RANGES

Errors

An error will occur if an operation exceeds the calculation ranges, or if a mathematically illegal operation is attempted. When an error occurs, pressing ◀ (or ▶) automatically moves the cursor back to the place in the equation where the error occurred. Edit the equation or press ON/C to clear the equation.

Error Codes and Error Types

Syntax error (Error 1):
- An attempt was made to perform an invalid operation.
  Ex. 2 2ndF ←→

Calculation error (Error 2):
- The absolute value of an intermediate or final calculation result equals or exceeds 10^{100}.
- An attempt was made to divide by 0 (or an intermediate calculation resulted in zero).
- The calculation ranges were exceeded while performing calculations.

Depth error (Error 3):
- The available number of buffers was exceeded. (There are 10 buffers* for numeric values and 24 buffers for calculation instructions).
  *5 buffers in STAT mode.
- Data items exceeded 100 in the statistics mode.

Equation too long (Error 4):
- The equation exceeded its maximum input buffer (142 characters). An equation must be shorter than 142 characters.

Calculation Ranges [16]

- **Within the ranges specified, this calculator is accurate to ±1 of the least significant digit of the mantissa. However, a calculation error increases in continuous calculations due to accumulation of each calculation error. (This is the same for $\sqrt{\ }$, x^2, $\sqrt[x]{\ }$, $n!$, e^x, $\ln$, etc., where continuous calculations are performed internally.)**
  Additionally, a calculation error will accumulate and become larger in the vicinity of inflection points and singular points of functions.
- Calculation ranges
  $-10^{100} < y < 10^{100}$, $\pm 9.999999999\times10^{99}$ and 0.

If the absolute value of an entry or a final or intermediate result of a calculation is less than 10^{-99}, the value is considered to be 0 in calculations and in the display.

BATTERY REPLACEMENT

Notes on Battery Replacement

Improper handling of batteries can cause electrolyte leakage or explosion. Be sure to observe the following handling rules:

- Make sure the new batteries are the correct type.
- When installing, orient each battery properly as indicated in the calculator.
- Batteries are factory-installed before shipment, and may be exhausted before they reach the service life stated in the specifications.

Notes on erasure of memory contents
When the battery is replaced, the memory contents are erased. Erasure can also occur if the calculator is defective or when it is repaired. Make a note of all important memory contents in case accidental erasure occurs.

When to Replace the Batteries

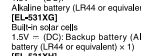
[EL-509X/531X/531XH] If the display has poor contrast, the batteries require replacement.
[EL-531XG] If the display has poor contrast or nothing appears on the display even when ON/C is pressed in dim lighting, it is time to replace the batteries.

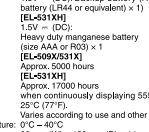
Cautions

- Fluid from a leaking battery accidentally entering an eye could result in serious injury. Should this occur, wash with clean water and immediately consult a doctor.
- Should fluid from a leaking battery come in contact with your skin or clothes, immediately wash with clean water.
- If the product is not to be used for some time, to avoid damage to the unit from leaking batteries, remove them and store in a safe place.
- Do not leave exhausted batteries inside the product.
- Keep batteries out of the reach of children.
- Exhausted batteries left in the calculator may leak and damage the calculator.
- Explosion risk may be encountered if batteries are handled incorrectly.
- Do not throw batteries into a fire as they may explode.

Replacement Procedure

1. Turn the power off by pressing 2ndF OFF.
2. Remove one screw or two screws. (Fig. 1)
3. Lift the battery cover to remove.
4. **[EL-509X/531X/531XG]** Remove the used battery by prying it out with a ball-point pen or other similar pointed device. (Fig. 2)
   [EL-531XH] Remove the used battery.
5. **[EL-509X/531X/531XG]** Install one new battery. Make sure the "+" side is facing up.
   [EL-531XH] Install one new battery. First insert the "⊖" side toward the spring. (Fig. 3)
6. Replace the cover and screws.
7. Press the RESET switch (on the back).
- Make sure that the display appears as shown below. If the display does not appear as shown, remove the batteries reinstall them and check the display once again.





Automatic Power Off Function

This calculator will turn itself off to save battery power if no key is pressed for approximately 10 minutes.

SPECIFICATIONS

Calculations:	Scientific calculations, statistical calculations, etc.
Internal calculations:	Mantissas of up to 14 digits
Pending operations:	24 calculations 10 numeric values (5 numeric values in STAT mode)
Power source:	**[EL-509X/531X]** 1.5V ⎓ (DC): Alkaline battery (LR44 or equivalent) × 1 **[EL-531XG]** Built-in solar cells 1.5V ⎓ (DC): Backup battery (Alkaline battery (LR44 or equivalent) × 1) **[EL-531XH]** 1.5V ⎓ (DC): Heavy duty manganese battery (size AAA or R03) × 1
Operating time:	**[EL-509X/531X]** Approx. 5000 hours **[EL-531XH]** Approx. 17000 hours when continuously displaying 55555. at 25°C (77°F). Varies according to use and other factors.
Operating temperature:	0°C – 40°C
External dimensions:	80 mm (W) × 158 mm (D) × 14 mm (H) 3-5/32" (W) × 6-7/32" (D) × 9/16" (H)
Weight:	**[EL-509X/531X]** Approx. 94.5 g (0.21 lb) (including battery) **[EL-531XG]** Approx. 94.5 g (0.21 lb) (including battery) **[EL-531XH]** Approx. 101 g (0.23 lb) (including battery)
Accessories:	Battery × 1 (installed), operation manual and hard case

FOR MORE INFORMATION ABOUT SCIENTIFIC CALCULATOR

Visit our Web site.
http://sharp-world.com/calculator/

SHARP
SHARP CORPORATION

EL-509X
EL-531X
EL-531XG
EL-531XH

CALCULATION EXAMPLES
ANWENDUNGSBEISPIELE
EXEMPLES DE CALCUL
EJEMPLOS DE CÁLCULO
EXEMPLOS DE CÁLCULO
ESEMPI DI CALCOLO
REKENVOORBEELDEN
PÉLDASZÁMÍTÁSOK
PŘÍKLADY VÝPOČTŮ
RÄKNEEXEMPEL
LASKENTAESIMERKKEJÄ
ПРИМЕРЫ ВЫЧИСЛЕНИЙ
UDREGNINGSEKSEMPLER
ตัวอย่างการคำนวณ
نماذج للحسابيات
计算例子
CONTOH-CONTOH PENGHITUNGAN
CONTOH-CONTOH PERHITUNGAN
نمونه محاسبات

[1]

①3(5+2)=	( ) 5 + 2) =	*21.*
②3×5+2=	3 × 5 + 2 =	*17.*
③3×(5+2)=	3 × 5 + 3 × 2 =	*21.*
→ ①	▲	*21.*
→ ②	▼	*17.*
→ ③	▼	*21.*
→ ②	▲	*17.*

[2]

45+285÷3=	45 + 285 ÷ 3 =	*140.*
$\frac{18+6}{15-8}$ =	(18 + 6) ÷ (15 − 8) =	*3.428571429*
42×(−5)+120=	42 × (+/−) 5 + 120 = *1	*−90.*
$(5\times10^3)\div(4\times10^{-2})$=	5 Exp 3 ÷ 4 Exp (+/−) 2 =	*1'250'000.*

*1 (5 (+/−) 3

[3]

34+57=	34 + 57 =	*91.*
45+57=	45 =	*102.*
79−59=	79 − 59 =	*20.*
56−59=	56 − 9 =	*−3.*
56÷8=	56 ÷ 8 =	*7.*
92×8=	92 × =	*11.5*
68÷25=	68 × 25 =	*1'700.*
68×40=	40 =	*2'720.*

[4]

sin cos tan $\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$ π DRG hyp (arc hyp)
ln log e^x 10^x x^{-1} x^2 x^3 y^x $\sqrt[y]{x}$
$\sqrt{x}$ $\sqrt[3]{x}$ nPr nCr %

$\sin 60^{\circ}$=	DRG sin 60 =	*0.866025403*
$\cos\frac{\pi}{4}$[rad]=	DRG cos (π ÷ 4) =	*0.707106781*
$\tan^{-1}1$=[g]	DRG 2ndF $\tan^{-1}$ 1 =	*50.*
(cosh 1.5 + sinh 1.5)^2 =	hyp cos 1.5 + hyp sin 1.5) x^2 =	*20.08553692*
$\tanh^{-1}\frac{6}{7}$ =	2ndF arc hyp tan (6 ÷ 7) =	*0.895879734*
ln 20 =	ln 20 =	*2.995732274*
log 50 =	log 50 =	*1.698970004*
e^3 =	2ndF e^x 3 =	*20.08553692*
$10^{1.7}$ =	2ndF 10^x 1.7 =	*50.11872336*
$\frac{1}{6}+\frac{1}{7}$=	6 2ndF x^{-1} + 7 2ndF x^{-1} =	*0.309523809*
$8^{-2}-3^4\times5^2$ =	8 y^x 2 +/− = 3 y^x 4 × 5 x^2 =	*−2'024.984375*
$(12!)^{\frac{1}{3}}$=	12 $x!$) y^x 4 2ndF x^{-1} =	*6.447419591*
$8^{\frac{1}{3}}$ =	8(x^{-1} =	*512.*
$\sqrt{49}-\sqrt[4]{81}$ =	(49 − 4 2ndF $\sqrt[x]{}$ 81 =	*4.*
$\sqrt[3]{27}$ =	2ndF $\sqrt[x]{}$ 27 =	*3.*
4! =	4 2ndF $x!$ =	*24.*
${}_{10}P_3$ =	10 2ndF $_nP_r$ 3 =	*720.*
${}_5C_2$ =	5 2ndF $_nC_r$ 2 =	*10.*
500×25%=	500 × 25 2ndF %	*125.*
120÷400=?%	120 ÷ 400 2ndF %	*30.*
500+(500×25%)=	500 + 25 2ndF %	*625.*
400−(400×30%)=	400 − 30 2ndF %	*280.*

- The range of the results of inverse trigonometric functions
- Der Ergebnisbereich für inverse trigonometrische Funktionen
- Plage des résultats des fonctions trigonométriques inverses
- El rango de los resultados de funciones trigonométricas inversas
- Gama dos resultados das trigonométricas inversas
- La gamma dei risultati di funzioni trigonometriche inverse
- Het bereik van de resultaten van inverse trigonometrie
- Az inverz trigonometriai funkciók eredmény-tartománya
- Rozsah výsledků inverzních trigonometrických funkcí
- Omfång för resultaten av omvända trigonometriska funktioner
- Käänteisten trigonometristen funktioiden tulosten alue
- Диапазон результатов обратных тригонометрических функций
- Område for resultater af omvendte trigonometriske funktioner
- หลักของผลลัพธ์ของฟังก์ชันวิโกณมิติกลับ
- نطاق نتائج الدوال المثلثية المعكوسة
- 反三角函数计算结果的范围
- Julat hasil fungsi trigonometri songsang
- Kisaran hasil fungsi trigonometri inversi
- ช่วงของผลลัพธ์ของฟังก์ชันตรีโกณมิติผกผัน
- محدودة نتائج مثلثية عكسية

	$\theta = \sin^{-1}x$, $\theta = \tan^{-1}x$	$\theta = \cos^{-1}x$
DEG	$-90 \le \theta \le 90$	$0 \le \theta \le 180$
RAD	$-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$	$0 \le \theta \le \pi$
GRAD	$-100 \le \theta \le 100$	$0 \le \theta \le 200$

[5]

DRG▶

90°→ [rad]	ON/C 90 2ndF DRG▶	*1.570796327*
→ [g]	2ndF DRG▶	*100.*
→ [°]	2ndF DRG▶	*90.*
$\sin^{-1}0.8$ = [°]	2ndF $\sin^{-1}$ 0.8 =	*53.13010235*
→ [rad]	2ndF DRG▶	*0.927295218*
→ [g]	2ndF DRG▶	*59.03344706*
→ [°]	2ndF DRG▶	*53.13010235*

[6]

ALPHA RCL STO M+ M− ANS

A=56	ON/C 56 STO A	*56.*
B=68	68 STO B	*68.*
A÷2+B×4=	ALPHA A ÷ 2 + ALPHA B × 4 =	*300.*
	ON/C 8 × 2 STO M	*16.*
24÷(8×2)=	24 ÷ ALPHA M =	*1.5*
(8×2)×5=	ALPHA M × 5 =	*80.*
	ON/C STO M	*0.*
$150\div3\cdot M1$	150 ÷ 3 M+	*450.*
+)$250\cdot M1=M1+250$	250 M+	*250.*
→M2=5%	RCL (M) × 5 2ndF %	*35.*
M	2ndF M− RCL M	*665.*
$1= ¥110$	110 STO Y	*110.*
¥26,510=$?	26510 = RCL Y ÷	*241.*
$2,750=¥?	2750 × RCL Y =	*302'500.*
r = 3cm	3 STO Y	*3.*
πr^2 = ? (r → Y)	π ALPHA Y x^2 =	*28.27433388*
$\frac{24}{4+6}$ = 2.4…(A)	24 ÷ (4 + 6) =	*2.4*
3×(A)+60÷(A)=	3 × ALPHA ANS + 60 ÷ ALPHA ANS =	*32.2*

[7]

6+4=ANS	ON/C 6 + 4 =	*10.*
ANS+5	+ 5 =	*15.*
8×2=ANS	8 × 2 =	*16.*
ANS^2	x^2 =	*256.*
44+37=ANS	44 + 37 =	*81.*
$\sqrt{ANS}$=	$\sqrt{}$ =	*9.*

[8]

$a\frac{b}{c}$ d/c

$3\frac{1}{2}+\frac{4}{3}=[a\frac{b}{c}]$	ON/C 3 $a\frac{b}{c}$ 1 $a\frac{b}{c}$ 2 + 4 $a\frac{b}{c}$ 3 =	*4 ┘5 ┌6*
→[a.xxx]	$a\frac{b}{c}$	*4.833333333*
→[d/c]	2ndF d/c	*29 ┌6*
$10^{\frac{2}{3}}$ =	2ndF 10^x 2 $a\frac{b}{c}$ 3 =	*4.641588834*
$(\frac{7}{5})^6$ =	7 $a\frac{b}{c}$ 5 y^x 5 =	*16807 ┘ 3125*
$(\frac{1}{8})^{\frac{1}{3}}$ =	1 $a\frac{b}{c}$ 8 y^x 1 $a\frac{b}{c}$ 3 =	*1 ┌ 2*
$\frac{64}{\sqrt{225}}$ =	$\sqrt{}$ 64 $a\frac{b}{c}$ 225 =	*8 ┌ 15*
$\frac{2^3}{3^4}$ =	(2 y^x 3) $a\frac{b}{c}$ (3 y^x 4) =	*8 ┘ 81*
$\frac{1.2}{2.3}$ =	1.2 $a\frac{b}{c}$ 2.3 =	*12 ┌ 23*
$\frac{1°2'3''}{2}$ =	1 DMS 2 DMS 3 $a\frac{b}{c}$ 2 =	*0°31'1.5"*
$\frac{1\times10^3}{2\times10^5}$ =	1 Exp 3 $a\frac{b}{c}$ 2 Exp 3 =	*1 ┌ 2*
A = 7	ON/C 7 STO A	*7.*
$\frac{4}{A}$ =	4 $a\frac{b}{c}$ ALPHA A =	*4 ┌ 7*
$1.25+\frac{2}{5}$ = [a.xxx]	1.25 + 2 $a\frac{b}{c}$ 5 =	*1.65*
→[$a\frac{b}{c}$]	$a\frac{b}{c}$	*1 ┌ 13 ┌ 20*
1.65	ON/C 1.65 =	*1.65*
→[$a\frac{b}{c}$]	$a\frac{b}{c}$	*1 ┌ 13 ┌ 20*
→[d/c]	2ndF d/c	*33 ┌ 20*
→[a.xxx]	$a\frac{b}{c}$	*1.65*

* 4 ┘ 5 ┌ 6 = $\frac{4}{5}\div\frac{6}{1}$

[9]

←BIN ←PEN ←OCT ←HEX ←DEC NEG NOT AND OR XOR XNOR

DEC(25)→BIN	ON/C 2ndF ←DEC 25 2ndF ←BIN	*11001*$_b$
HEX(1AC)	2ndF ←HEX 1AC	
→BIN	2ndF ←BIN	*110101100*$_b$
→PEN	2ndF ←PEN	*3203*$_p$
→OCT	2ndF ←OCT	*654*$_o$
→DEC	2ndF ←DEC	*428.*
BIN(1010−100)	2ndF ←BIN (1010 − 100)	
×11 =	× 11 =	*10010*$_b$
BIN(111)→NEG	NEG 111 =	*111111001*$_b$
HEX(1FF)+	2ndF ←HEX 1FF 2ndF ←OCT +	
OCT(512)=	512 =	*1511*$_o$
HEX(?)	2ndF ←HEX	*349*$_H$
2FEC−	ON/C STO M 2ndF ←HEX 2FEC −	
2C9E=(A)	2C9E M+	*34E*$_H$
+)2000−	2000 −	
1901=(B)	1901 M−	*6FF*$_H$
(C)	RCL M	*A4d*$_H$
1011 AND	ON/C 2ndF ←BIN 1011 AND	
101 = (BIN)	101 =	*1*$_b$
5A OR C3 = (HEX)	2ndF ←HEX 5A OR C3 =	*db*$_H$
NOT 10110 = (BIN)	2ndF ←BIN NOT 10110 =	*111110100*$_b$
24 XOR 4 = (OCT)	2ndF ←OCT 24 XOR 4 =	*20*$_o$
B3 XNOR	2ndF ←HEX B3 XNOR	
2D = (HEX)	2D =	*FFFFFFFE6*$_H$
→DEC	2ndF ←DEC	*−159.*

[10]

°'" ↔DEG

12°39'18.05" → [10]	ON/C 12 °'" 39 °'" 18.05 2ndF ↔DEG	*12.65501389*
123.678 → [60]	123.678 2ndF ↔DEG	*123°40'40.8"*
3h30m45s + 6h45m36s = [60]	3 °'" 30 °'" 45 + 6 °'" 45 °'" 36 =	*10°16'21"*
1234°56'12" + 0°0'34.567" = [60]	1234 °'" 56 °'" 12 + 0 °'" 0 °'" 34.567 =	*1234°56'47"*
3h45m − 1.69h = [60]	3 °'" 45 − 1.69 = 2ndF ↔DEG	*2°3'36"*
sin62°12'24" = [10]	sin 62 °'" 12 °'" 24 =	*0.884635235*

[11]

↔r/θ ↔x/y x y ←→

$\begin{cases} x=6 \\ y=4 \end{cases} \rightarrow \begin{cases} r= \\ \theta=[°] \end{cases}$	ON/C 6 2ndF , 4 2ndF ←→r/θ 2ndF ←→r/θ 2ndF ←→r/θ	*7.211102551* *33.69006753* *7.211102551*
$\begin{cases} r=14 \\ \theta=36[°] \end{cases} \rightarrow \begin{cases} x= \\ y= \end{cases}$	14 2ndF , 36 2ndF ←→x/y 2ndF ←→x/y 2ndF ←→x/y	*11.32623792* *8.228993532* *11.32623792*

[12]

MDF SET UP

5+9=ANS	ON/C SET UP 5 0 SET UP 1	
ANS|÷9=	5 ÷ 9 =	*0.6*
[FIX,TAB=1]	× 9 = *1	*5.0*
	5 ÷ 9 + 2ndF MDF	*0.6*
	× 9 = *2	*5.4*
	SET UP 0 3	

*1 5.5555555555555×10^{-1}×9
*2 0.6×9

[13]

DATA (x,y) $\bar{x}$ S_x σ_x n Σx Σx^2 $\bar{y}$
S_y σ_y Σy Σy^2 r a b c
$\hat{x}'$ $\hat{y}'$ ←→

x	y
95	
80	
80	
75	
75	
75	
50	

DATA

	MODE 1 0 *0.*
	95 DATA *1.*
	80 DATA *2.*
	DATA *3.*
	75 (x,y) 3 DATA *4.*
	50 DATA *5.*
$\bar{x}$=	RCL $\bar{x}$ *75.71428571*
σx=	RCL σ_x *12.37179148*
n=	RCL n *7.*
Σx=	RCL Σx *530.*
Σx^2=	RCL Σx^2 *41'200.*
sx=	RCL S_x *13.3630621*
sx^2=	x^2 = *178.5714286*
$\frac{(95-\bar{x})}{s_x}\times10+50$=	(95 − ALPHA $\bar{x}$) ÷ ALPHA S_x × 10 + 50 = *64.43210706*

x	y
2	5
2	5
12	24
21	40
21	40
21	40
15	25

	MODE 1 ( ) *0.*
	2 (x,y) 5 DATA *1.*
	DATA *2.*
	12 (x,y) 24 DATA *3.*
	21 (x,y) 40 (x,y) 3 DATA *4.*
	15 (x,y) 25 DATA *5.*
	RCL $\bar{x}$ *1.050261097*
	RCL b *1.826044386*
	RCL r *0.995176343*
	RCL S_x *8.541216597*
	RCL S_y *15.67223812*
x=3 → y'=?	3 2ndF $\hat{y}'$ *6.528394256*
y=46 → x'=?	46 2ndF $\hat{x}'$ *24.61590706*

x	y
12	41
8	13
5	2
23	200
15	71

	MODE 1 0 *0.*
	12 (x,y) 41 DATA *1.*
	8 (x,y) 13 DATA *2.*
	5 (x,y) 2 DATA *3.*
	23 (x,y) 200 DATA *4.*
	15 (x,y) 71 DATA *5.*
	RCL a *5.357506761*
	RCL b *−3.120289663*
	RCL c *0.503334057*
x=10 → y'=?	10 2ndF $\hat{y}'$ *24.4680159*
y=22 → x'=?	22 2ndF $\hat{x}'$ *9.63201409*
	2ndF ←→ *−3.432772026*
	2ndF ←→ *9.63201409*

[14]

DATA ▲ ▼

DATA
30
40
40
50

↓

DATA
30
45
45
45
60

MODE 1 0	*0.*
30 DATA	*1.*
40 DATA	*2.*
50 DATA	*3.*
▼ ▼ ▼	
45 (x,y) 3 DATA	$\bar{x}2$ = *45.*
▼	$\bar{n}2$ = *3.*
▼ 60 DATA	$\bar{x}3$ = *60.*

[15]

$$\bar{x}=\frac{\Sigma x}{n} \qquad \sigma x=\sqrt[n]{\frac{\Sigma x^2-n\bar{x}^2}{n}}$$

$$sx=\sqrt{\frac{\Sigma x^2-n\bar{x}^2}{n-1}} \qquad \Sigma x=x_1+x_2+\cdots+x_n \quad \Sigma x^2=x_1^2+x_2^2+\cdots+x_n^2$$

$$\bar{y}=\frac{\Sigma y}{n} \qquad \sigma y=\sqrt[n]{\frac{\Sigma y^2-n\bar{y}^2}{n}}$$

$$sy=\sqrt{\frac{\Sigma y^2-n\bar{y}^2}{n-1}} \qquad \Sigma xy=x_1y_1+x_2y_2+\cdots+x_ny_n \quad \Sigma y=y_1+y_2+\cdots+y_n \quad \Sigma y^2=y_1^2+y_2^2+\cdots+y_n^2$$

[16]

Function	Dynamic range
Funktion	zulässiger Bereich
Fonction	Plage dynamique
Función	Rango dinámico
Função	Gama dinâmica
Funzioni	Campi dinamici
Functie	Rekencapaciteit
Függvény	Megengedett számítási tartomány
Funkce	Dynamický rozsah
Funktion	Definitionsområde
Funktio	Dynaaminen ala
Фукция	Динамический диапазон
Function	Dynamikområde
ฟังก์ชัน	المجال الفاعلياتي
函数	取值范围
Fungsi	Julat dinamik
Fungsi	Kisaran dinamis
وظيفة	محدودة حركتي

sin x, cos x, tan x	DEG:	$\|x\| < 10^{10}$ $(\tan x : \|x\| \neq 90\ (2n-1))^*$
	RAD:	$\|x\| < \frac{\pi}{180}\times10^{10}$ $(\tan x : \|x\| \neq \frac{\pi}{2}(2n-1))^*$
	GRAD:	$\|x\| < \frac{10}{9}\times10^{10}$ $(\tan x : \|x\| \neq 100\ (2n-1))^*$
$\sin^{-1}x$, $\cos^{-1}x$	$\|x\| \le 1$	
$\tan^{-1}x$, $\sqrt[3]{x}$	$\|x\| < 10^{100}$	
ln x, log x	$10^{-99} \le x < 10^{100}$	
y^x	• y > 0: $-10^{100} < x \log y < 100$ • y = 0: $0 < x < 10^{100}$ • y < 0: $x \in n$ $(0 < \|x\| < 1: \frac{1}{x} = 2n-1,\ x \neq 0)^*$, $-10^{100} < x \log \|y\| < 100$	
$x\sqrt{y}$	• y > 0: $-10^{100} < \frac{1}{x}\log y < 100\ (x \neq 0)$ • y = 0: $0 < x < 10^{100}$ • y < 0: $x = 2n-1$ $(0 < \|x\| < 1: \frac{1}{x} = n,\ x \neq 0)^*$, $-10^{100} < \frac{1}{x}\log \|y\| < 100$	
e^x	$-10^{100} < x \le 230.2585092$	
10^x	$-10^{100} < x < 100$	
sinh x, cosh x, tanh x	$\|x\| \le 230.2585092$	
$\sinh^{-1}x$	$\|x\| < 10^{50}$	
$\cosh^{-1}x$	$1 \le x < 10^{50}$	
$\tanh^{-1}x$	$\|x\| < 1$	
x^2	$\|x\| < 10^{50}$	
x^3	$\|x\| < 2.15443469\times10^{33}$	
$\sqrt{x}$	$0 \le x < 10^{100}$	
x^{-1}	$\|x\| < 10^{100}$ $(x \neq 0)$	
n!	$0 \le n \le 69^*$	
nPr	$0 \le r \le n \le 9999999999^*$ $\frac{n!}{(n-r)!} < 10^{100}$	
nCr	$0 \le r \le n \le 9999999999^*$ $\frac{n!}{(n-r)!} < 10^{100}$	
↔DEG, D'M'S	$0°0'0.00001" \le \|x\| < 10000°$	
$x, y \rightarrow r, \theta$	$\sqrt{x^2+y^2} < 10^{100}$	
$r, \theta \rightarrow x, y$	$0 \le r < 10^{100}$ DEG: $\|\theta\| < 10^{10}$ RAD: $\|\theta\| < \frac{\pi}{180}\times10^{10}$ GRAD: $\|\theta\| < \frac{10}{9}\times10^{10}$	
DRG▶	DEG→RAD, GRAD→DEG: $\|x\| < 10^{100}$ RAD→GRAD: $\|x\| < \frac{2}{\pi}\times10^{98}$	
→DEC →BIN →PEN →OCT →HEX AND OR XOR XNOR	DEC : $\|x\| \le 9999999999$ BIN : 1000000000 ≤ x ≤ 1111111111 0 ≤ x ≤ 111111111 PEN : 2222222223 ≤ x ≤ 4444444444 0 ≤ x ≤ 2222222222 OCT : 4000000000 ≤ x ≤ 7777777777 0 ≤ x ≤ 3777777777 HEX : FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FF	
NOT	BIN : 1000000001 ≤ x ≤ 1111111111 0 ≤ x ≤ 111111111 PEN : 2222222223 ≤ x ≤ 4444444444 0 ≤ x ≤ 2222222221 OCT : 4000000000 ≤ x ≤ 7777777777 0 ≤ x ≤ 3777777777 HEX : FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FE	
NEG	BIN : 1000000001 ≤ x ≤ 1111111111 0 ≤ x ≤ 111111111 PEN : 2222222223 ≤ x ≤ 4444444444 0 ≤ x ≤ 2222222222 OCT : 4000000001 ≤ x ≤ 7777777777 0 ≤ x ≤ 3777777777 HEX : FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FF	

* n, r: integer / ganze Zahlen / entier / entero / inteiro / intero / geheel getal / egész számok / celé číslo / heltal / kokonaisluku / เต็มจำนวน / عدد صحيح / 整数 / integer / bilangan bulat / عدد صحيح

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